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How Energy Determines the Job

While such measurements have seldom been perfected, we do have crude estimates based on what has been done by way of measuring the energy metabolism in artificially localized tracts of the body and in various occupations and activities. A few of these measurements have been made with great care and precision.

Study the following table, then, with care. Notice at once the astonishing fact that standing up not relaxed increases the consumption of energy about 15% above the amount used up when a man sits down. Walking slowly increases it 100%, while such activities as swimming, running, heavy exercise, and walking very fast increase it 500% and more. Can anyone reasonably doubt that, in man's free selection of occupations, sports, and ways of living, such differences count tremendously? Or that they may be the one decisive factor in men whose rate of storing up energy is subnormal?

Notice, too, the wide variations in energy needed in different occupations. A tailor uses up 135 calories an hour; but a carpenter uses more than once and a half again as much,

while a lumberman sawing wood and a swimmer consume more than three times as much.

ENERGY EXPENDITURE PER HOUR UNDER DIFFERENT CONDITIONS OF MUSCULAR ACTIVITY *

<i>Form of Activity</i>	<i>Calories per Hour per 70 Kilograms (154 pounds, weight of average adult male)</i>
Sleeping	65
Awake	77
Sitting at rest	100
Reading aloud	105
Standing relaxed	105
Hand sewing	111
Standing at attention	115
Knitting (23 stitches per minute on sweater)	116
Dressing and undressing	118
Singing	122
Tailoring	135
Typewriting rapidly	140
Ironing with 5-pound iron	144
Dishwashing (plates, bowls, cups and saucers)	144
Sweeping bare floor 38 strokes per minute	169
Book binding	170
"Light exercise"	170
Shoemaking	180
Walking slowly (2.6 miles per hour)	200
Carpentry, metal working	240
"Active exercise"	290
Walking moderately fast (3.75 miles per hour)	300

* Compiled by M. S. Rose, and reported by Henry C. Sherman, "Chemistry of Food and Nutrition," Table 23, page 195.

<i>Form of Activity</i>	<i>Calories per Hour per 70 Kilograms (154 pounds, weight of average adult male)</i>
Stone working	400
"Severe exercise"	450
Sawing wood	480
Swimming	500
Running (5.3 miles per hour)	570
"Very severe exercise"	600
Walking very fast (5.3 miles per hour)	650

The magnitude of these variations is surprising. They have tremendous significance in the processes of natural selection. I cannot resist the conclusion that at least the wider differences of energy consumption in occupations must be quite closely correlated with important differences in personality patterns. It stands to reason that a man whose body naturally generates a great quantity of energy will hardly remain long over a tailor's needle, while another man who manufactures barely enough to keep his body running will not fling himself blithely into the deep forest with an axe.

Nor, in all probability, does the correlation stop with such gross differences. Consider the cumulative effect on body and mind which ensues, on the one hand, when the body does not use up the energy it generates spontaneously and, on the other hand, when it is taxed beyond its normal capacities. Exceedingly slight divergencies in either direction must react upon the work-

er's attitudes, his interest in his work, his inclination to look about for another job, and his mistakes of craftsmanship.

It is almost certain that *the narrower the margin of energy, the more surely will the person select behavior which taxes him least and at the same time satisfies him best within the known range of low-powered activities.* The man of immense energies, be they vegetative, muscular, or mental, will spill them more or less carelessly; for it makes little difference to him whither they go. He always has more than enough power on tap for anything he may be moved to do. But the underpowered man, like the poor toiler, has to count his calories and dole them out with niggardly hand. Each one weighs heavily in the scales of his life. A little loss there, a slight overstrain here may upset his entire equilibrium. And for him an upset kills.

As a rule, people of high energy adjust themselves easily to all social relations where they must lead or manage other people. They get on well with their fellows, and can persuade, argue, debate, and generally do business with others. Those of low power are usually averse to selling goods, giving after-dinner talks, managing an office force, running a factory, engaging in politics, or doing anything else which throws them into frequent intimate contacts where they must manage others; but they have no trouble in dealing with animals or inanimate things. Do not misinterpret these facts to mean

that in casual social relations people of high energy "get along" better than those of low. Here we refer only to those activities involving in some sense the management of others. People with but a tiny trickle of energy, however, not only cannot even deal continuously and effectively with things, but they are forced to avoid the simplest social contacts, or be worn out by the strain on their frail motors. Hence they narrow their activities to "the life of the spirit."

Why? Because *dealing with other people consumes much more energy than dealing with things; and dealing with things consumes much more energy than dealing with thoughts.*

HIGH POWER JOBS

In the personal relations, two factors release large energy streams: first, the actual labor of dealing with people, and secondly, the spontaneous emotional reactions in the presence of people. Look, for instance, at such familiar lines of personal and social work as these:

Managing a family
Teaching school
Being a physician or nurse
Managing workmen
Selling goods by personal solicitation
Being a court lawyer

Public lecturing
Acting

Compare the probable drain of energy in any of these with that of the tailor, the book-binder, the metal worker, and carpenter, whose metabolisms were reported on page 44. While we have no laboratory records showing the energy expended by the mother of three children who must manage her own home and supervise her offspring, it is quite plain that, on the emotional side and on the work side of her life, she consumes the energy of many tailors. If it takes nine tailors to make a man, it must take forty to make a housewife. Domestic science experts have counted the steps she takes in her kitchen during the preparation of meals; their findings are not before me now, but the mileage is appalling. But even this is slight in comparison with the relentless spurts of emotional energy released in worrying over her children's food, their health, their getting to school on time, their dress, their naughtinesses; in anger at their misbehavior, at the way a neighbor's lad has smeared their pretty dresses with mud, at the windows they have smashed; and in pleasant excitement over their good marks at school, their winning a game of ball, and their neatness on Sunday. The wonder of it all is that more housewives do not collapse and end in asylums.

Similarly with other personal occupa-

tions. Each uses much energy in two ways, as contrasted with the one way of the ordinary man's labor over shoes, paint, lumber, stone, and other things. And these latter labors use much more power than any mental work does.

ALL THINKING USES LITTLE ENERGY

One of the best indirect proofs of the small amount of energy used in mental work is to be found in the extraordinary ease, smoothness, and absence of all fatigue in pursuing a line of thought in which one is deeply interested for hours, days, or even weeks, with few or no interruptions. Everybody who has had any extended experience in some field of intellectual effort is familiar with this agreeable phenomenon. I have witnessed it in scientists working over some abstruse problem, in authors fired by a powerful idea for a novel or play, and occasionally even in college students with a newly discovered love for a subject. In the few cases I have been able to watch at all closely, such persons seem to eat as usual or else markedly less than usual; they sleep as usual or less than usual, never longer; and they pursue their usual routine of muscular exercise. Nothing develops that remotely suggests exhaustion or even enhanced metabolism. To be sure, there may be eye strain or a stiff neck or weary fingers and cramped leg muscles, together with the minor discomfort that goes with sitting still too long.

But these may be discounted as accidents in the technique of work; and in some highly efficient intellectual workers they are never found.

Mental work warms us up only $\frac{1}{25}$ th as much as ordinary walking. The ingenious Benedicts, at the Nutrition Laboratory of the Carnegie Institution, have tested people in arithmetic while their bodies were in a state of complete relaxation; and they find that the energy in one-half of a salted peanut is enough to keep one going through a solid hour of the hardest sort of multiplying "in one's head."

• This proves that the mere amount of energy is, for all practical purposes, negligible in mental work. But it throws no light on our problem of tapping energies for such tasks. What we wish to learn is: how do we release energy into the nerve tracts which must be used for mental work? For instance, is it more efficient to lie very quiet, as did the calculators on whom the Benedicts experimented; or would there be an advantage in sitting up, or in standing, or in walking about, or in reciting the problems and their solutions? Again: can we multiply numbers (or do any other specific task) more efficiently if we are alone, or if other people are present? Do we tap the elusive cerebral energies more quickly before or after meals? Do we work best in many short spurts or in long, steady pulls? Do we progress fastest if we work at top speed while under way or at a medium pace or at our slowest? Does the brain

serve us best on a mixed diet, or a meat-eggs-and-milk diet enormously rich in proteins, or on a vegetable diet? Is it better to sleep as long as possible at a stretch, or to sleep as little as possible at night and take a few naps through the day? Better to work outdoors or indoors? Better to work in summer or in winter? Questions like these must deeply concern everybody who has the slightest interest in making the most of himself in any field of achievement. To seek answers which may apply to people of various ages, native abilities, and backgrounds shall be our aim here.